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Transportation

**CIVIL RESERVE AIR FLEET LOAD
PLANNING – BOEING (McDonnell-Douglas) MD-90 Series**

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This pamphlet series is intended as a load planning guide and provides the basic information, data, and technical specifications needed in order for planners (both long range and individual movement) to load plan aircraft in the Civil Reserve Air Fleet (CRAF). Equipment and methods listed are compatible with all CRAF aircraft and cargo areas discussed. **It must be noted that, unlike military cargo aircraft, civilian airframes are not standardized, and can vary widely, even within each carrier's fleet. Final approval, therefore, ultimately rests with the individual contractor providing airlift services to the DOD.**

This pamphlet series enables application of DTR 4500.9-R, Defense Transportation Regulation – Part III Mobility, Appendix V, Aircraft Load Planning and Documentation; as well as AMCI 10-402, Civil Reserve Air Fleet (CRAF). The guidance contained herein is applicable to all USAF, AFRC, ANG and DOD agencies whenever they are charged with using the CRAF assets contained herein, in accordance with DOD, inter-service, and/or MAJCOM agreements.

Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Form 847s to: HQ AMC/A3B – DOD Commercial Airlift Division, 402 Scott Dr., Unit 3A1, Scott AFB, IL 62225-5302 or electronically to: AMC-A3BC@scott.af.mil. When new/additional information is received, it will be provided as a change to this publication. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, Management of Records, and disposed of in accordance with the Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS) located at <https://www.my.af.mil/gcss-af61a/afirms/afirms/rims.cfm>. The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force.

SUMMARY OF CHANGES

This document is substantially revised and must be completely reviewed.

Series has been renumbered, reorganized, and data added

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Chapter 1

GENERAL INFORMATION

1.1. Purpose. This pamphlet series is non-directive in nature. It provides the basic information, data, and technical specifications needed in order for planners to more efficiently and effectively load plan aircraft in the CRAF.

1.2. Scope. CRAF aircraft specifications listed herein are current as of the date of this printing. Equipment and methods listed are compatible with all CRAF aircraft and cargo areas discussed. **It must be noted that, unlike military cargo aircraft, civilian airframes are not standardized, and can vary widely, even within each carrier's fleet. Final approval, therefore, ultimately rests with the individual contractor providing airlift services to the DOD.**

1.2.1. Volume 4, Boeing (McDonnell Douglas). AMCPAM 24-2 Volume 4 deals specifically with aircraft originally manufactured by McDonnell Douglas Corporation. McDonnell Douglas Corp. first formed in 1967 after the Douglas Co. (founded 1920) and McDonnell Aircraft Corp. (originating in 1928) merged. Through the last merger into the Boeing Company in 1997, the Boeing Company has melded the companies founded by aerospace pioneers William Boeing, Donald Douglas, James McDonnell, James "Dutch" Kindelberger, and Howard Hughes Jr. As of the date of this publication, the Boeing Company has produced almost 17,000 commercial jet aircraft alone, with over 12,100 still in service.

1.3. Arrangement. This pamphlet series is designed for easy reference and access to the most commonly needed information for planning purposes. Essentially, Volume 1 will contain all information common to the entire CRAF program and most, if not all, carriers. Volumes 2 through 5 will contain information specific to a particular manufacturer's airframes, with each sub-volume addendum addressing a different series or type. Each can be referenced separately from another; however, each addendum needs to be used in conjunction with Volume 1.

1.3.1. Volume 4, Boeing (McDonnell Douglas) Addenda. Volume 4 is not separated from each subsequent addendum, but is published as a "cover" document along with and as an introduction for each addendum. The same information for Volume 4 essentially gets republished--unchanged with each Boeing (McDonnell Douglas) model's addendum.

1.3.2. Volume 4, Boeing (McDonnell Douglas) Quick Reference Tables. All chapter descriptions for various models are designed to be used in conjunction with Chapter 2 Quick Reference Tables. The information in the Quick Reference Tables will generally not be restated in the expanded chapters as they are meant primarily for pictorial figures.

1.4. Supplements. Changes or supplements to this pamphlet by agencies, other than AMC, are prohibited. This does not preclude its use as a reference document for preparation of intra-agency instructional directives.

1.5. Acronyms. An explanation of the acronyms used in this pamphlet is in AMCPAM 24-2, Volume 1, Attachment 1.

1.6. Copyrights. All drawings and diagrams, unless otherwise noted, are derived from copyright © or copyrightable material of The Boeing Company. Used by permission. All rights reserved.

1.7. Description. Addendum E. Boeing (McDonnell Douglas) MD-90 Series.

The MD-90 Series aircraft are narrow body, single-aisle, twin-engine aircraft, designed for medium range. This is an advance in the line of aircraft that was originally the DC-9 Series, which then transitioned to the MD-80 Series. The MD-90 continued with the five-abreast seating arrangements of its predecessors, but incorporated all of the innovations of the MD-88, as well as a longer fuselage, newer, more efficient and powerful engines and an advanced flight deck (with later-built models having a full "glass cockpit"). The MD-90 Series was initially set to continue on much longer than it actually did, and a second production line actually opened up in Shanghai, China. However, after the McDonnell Douglas - Boeing merger of 1997, the decision was made to discontinue the Series, since the B737-800's basically covered the same market demand. From the initial delivery in February 1995 until the last MD-90 was delivered on October 2000, 116 MD-90's were manufactured.

The first and only model in the Series, the **MD-90-30**, was type-certified in November 1994. The MD-90-30 shares the same fuselage diameter and fuselage aft-mounted engines as the DC-9 and MD-80 Series, as well as the MD-80's unique, middle lower cargo compartment, in addition to the forward and aft sections. The MD-90-30's engines and interior were also redesigned to allow for a more comfortable and quieter ride than the DC-9 or MD-80. An Extended Range version, the MD-90ER, was also offered, but only one was built.

AMCPAM 24-2, Volume 4, Addendum E will focus primarily on the:
MD-90-30

Chapter 2

QUICK REFERENCE TABLES

2.1. Ranges. Most numbers are shown as a range, due to representing all-passenger to all-freight versions OR due to different modifications within a series/type. Also, within a series, several different engines/weight classes may exist.

2.2. Pallets. Unless otherwise noted, pallet information is based on the civilian pallet IATA code PAG- / P1P- type LD7 which measures 88" × 125".

2.3. Table Legends.

2.3.1. Compartments. Unless otherwise noted, compartments are: M=Main/Upper; F=Forward/Lower Lobe; A=Aft/Lower Lobe; B=Bulk/Lower Lobe.

2.3.2. "X". An "X" represents the information does NOT apply for that series/type (ex: an all-passenger version would have an "X" by Main Compartment Door)

2.3.3. Question Mark "?". A "?" represents that the information should apply, but no information exists in the manufacturer's technical manuals.

2.3.4. Exclamation Point "!". An "!" represents information that should apply, but has been derived from a reliable, but non-manufacturer source.

2.4. After-Market Conversions. As a reminder, individual airlines may have converted an airframe apart from the manufacturer's original specifications. These tables and the charts in the following chapters do not account for this.

2.5. Tables. The following tables (Tables 2.1 through 2.6) will vary with each AMCPAM 24-2, Volume 4 Addendum.

2.6. Tables. Addendum E. Boeing (McDonnell Douglas) MD-90 Series.**Table 2.1. Cargo Planning.**

Aircraft Type	Pallets (88"×125") Max Ht	Range w/ Max ACL (NM)	Maximum ACL (ST) per Leg Length (NM)				Ferry Range w/ No Cargo (NM)
			2000	2500	3000	3500	
MD90-30	M= 0, F= 0, Mid= 0, A= 0	1,200	15.5	8.75	X	X	2,900

Table 2.2. Passenger Planning.

Aircraft Type	Standard Seating	Max Seats (One Class)	Range w/ Max Troops (NM)	Maximum Troops per Leg Length (NM)			
				2,000	2,500	3,000	3,500
MD90-30	155	172	1,650	151	85	X	X

Table 2.3. Door Clearances/Sizes.

Aircraft Type	Door Height from ground (in inches)					Door Size (W×H) (in inches)			
	Front/ Side Pax	Main/ Upper Deck	Lower Lobe FWD	Lower Lobe MID	Lower Lobe AFT	Main Deck	Lower Lobe FWD	Lower Lobe MID	Lower Lobe AFT
MD90-30	88 to 96	X	46 to 53	51 to 56	59 to 65	X	53 × 50	53 × 50	53 × 50

Table 2.4. Compartment Dimensions.

Aircraft Type	Compartment Dimensions (L×W×H) (in inches)				Compartment Weight limit (lbs)			
	Main/ Upper Deck	Lower Lobe FWD	Lower Lobe MID	Lower Lobe AFT	Main/ Upper Deck	Lower Lobe FWD	Lower Lobe MID	Lower Lobe AFT
MD90-30	X	304 × 32.9(@fl) 82 × 39.1	345 × 32.9(@fl) 82 × 39.1	300 × 32.9(@fl) 82 × 39.1	X	6,510	6,860/ 9,320	6,645

Table 2.5. Weight Information.

Aircraft Type	Maximum Design Weight						
	Ramp/ Taxi (MTW)	T/O (MTW)	Land (MLW)	Zero Fuel (MZFW)	Oper Empty (OEW)	Max Payload	Max Cargo Vol. (FT³)
MD90-30	157,000 – 168,500	156,000 – 168,000	142,000 – 142,000	130,000 – 132,000	88,171 – 89,059	41,829 – 42,941	1,300 – 1,177

Table 2.6. Airfield Suitability Information.

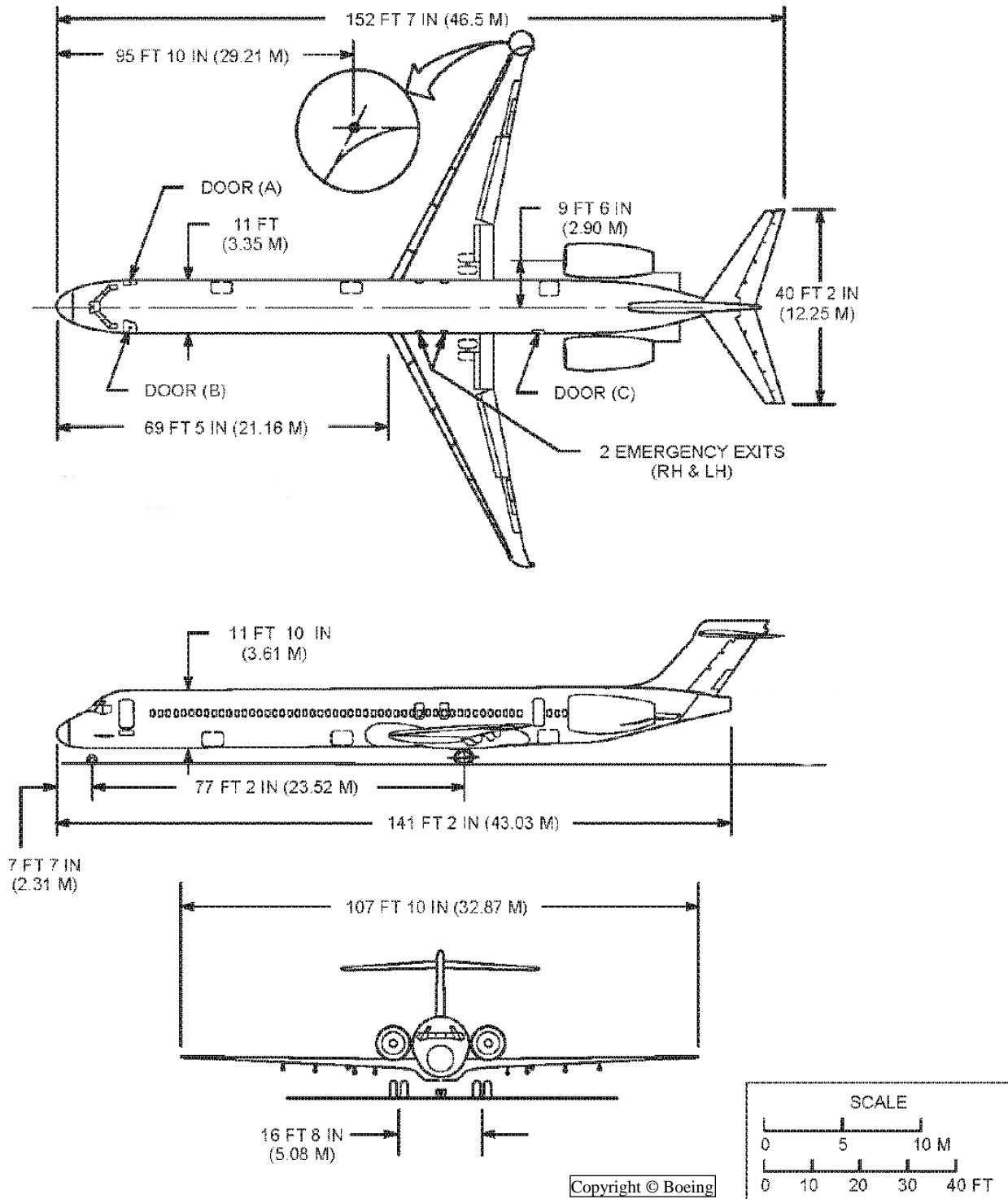
Aircraft Type	Max Usable Fuel (US Gal)	T/O Min RWY at MTW (FT)	LND Min RWY at MLW (FT)	Parking Ramp Footprint (L×W)	Electrical (Ground Op's & Maintenance)	Air (Starting) (SL, Std Day)	Gear Type
							New FAA / USAF
MD90-30	5, 840 – 6,405	7,000	5,500	152' 7" × 107' 10"	115/200V 3-ph, 400 Hz 90 KVA	Min - 51 PSIA 260° C	D/DW / TD

Chapter 3 MD-90-30

3.1. DIMENSIONS.

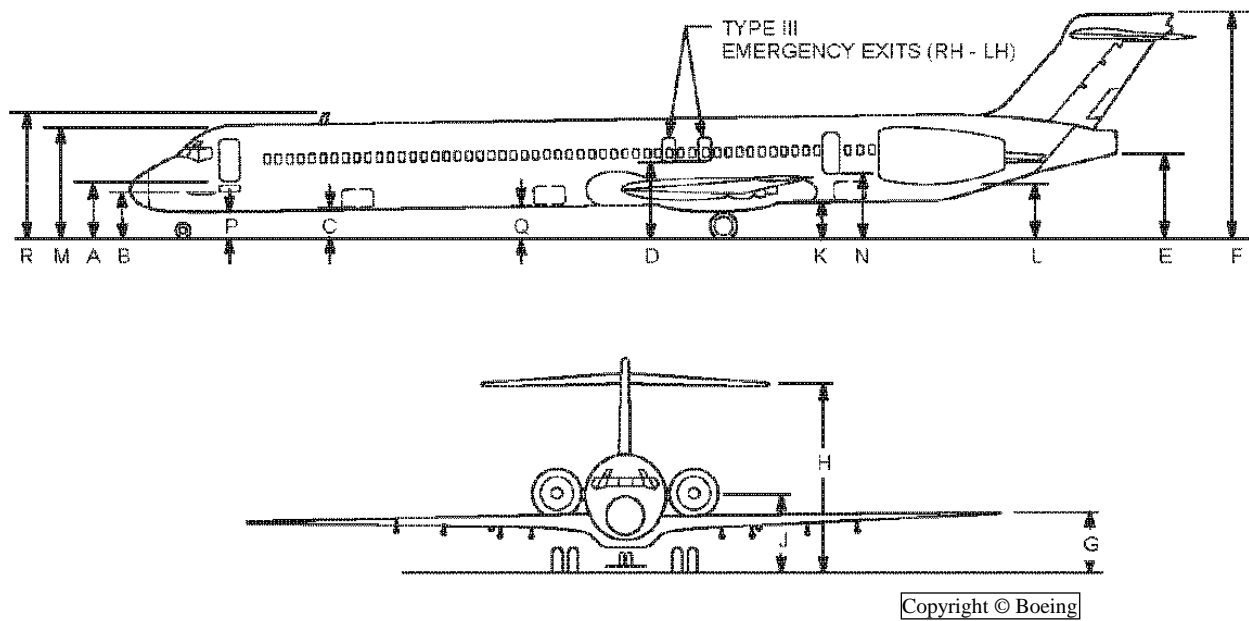
3.1.1. General Dimensions.

Figure 3.1. General Dimensions MD-90-30.



3.1.2. Ground Clearance.

Figure 3.2. Ground Clearance MD-90-30.



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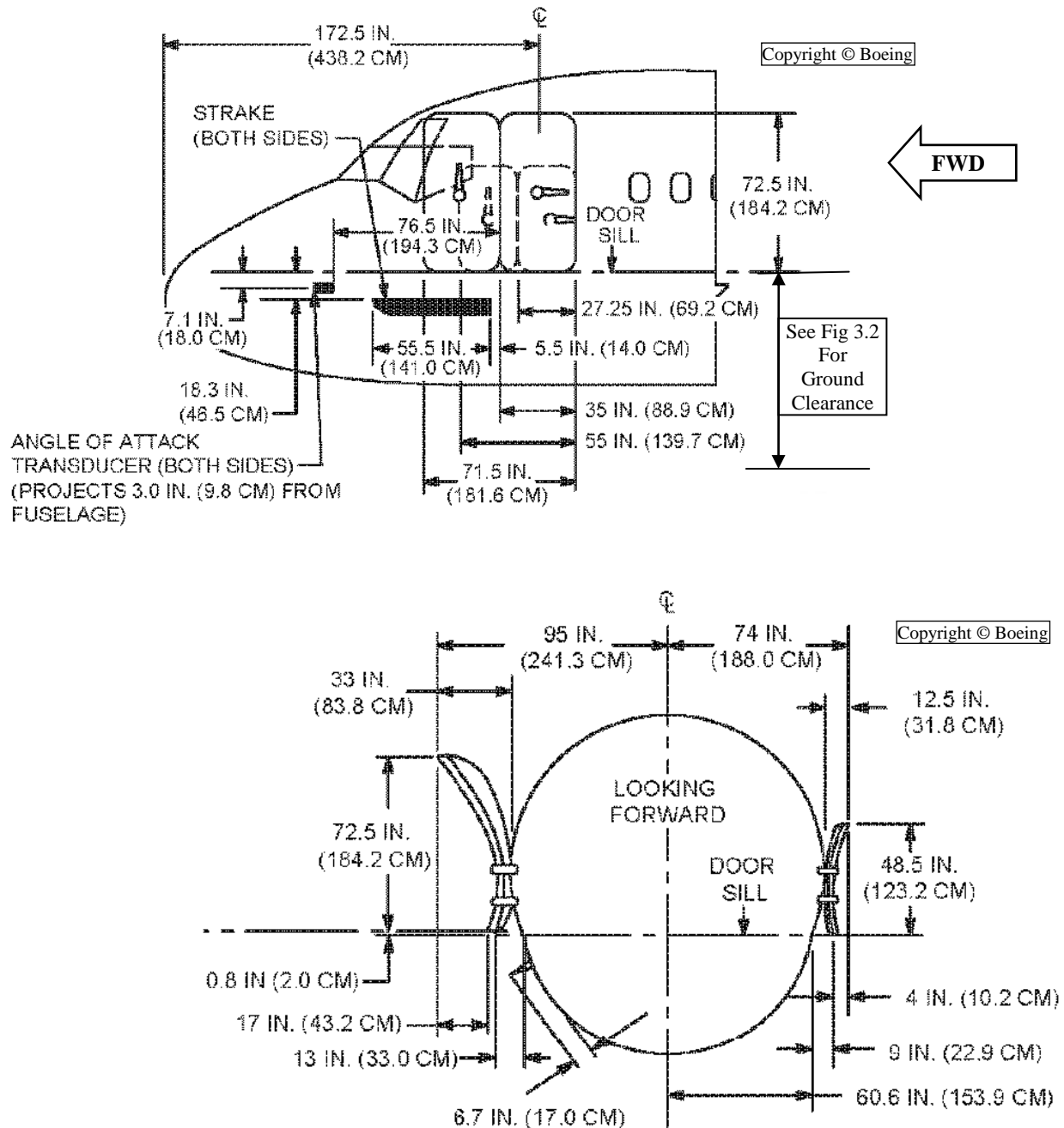
Vertical Clearances				
DOOR		Min		Max
Pax/Crew	A	7' 4"		8' 0"
	B	5' 5"		6' 5"
FWD	C	3' 10"		4' 5"
	D	10' 4"		10' 8"
	E	11' 3"		12' 0"
	F	30' 5"		31' 2"
	G	8' 4"		8' 10"
	H	26' 8"		27' 5"
	J	10' 10"		1' 5"
AFT	K	4' 11"		5' 5"
	L	6' 6"		7' 1"
	M	14' 11"		15' 7"
	N	8' 8"		9' 1"
	P	3' 1"		3' 8"
MID	Q	4' 3"		4' 8"
	R	16' 5"		17' 0"

3.2. COMPARTMENT CONFIGURATIONS.

3.2.1. MAIN/PASSENGER COMPARTMENT.

3.2.1.1. Pax/Crew Door.

Figure 3.3. Pax/Crew Door MD-90-30.

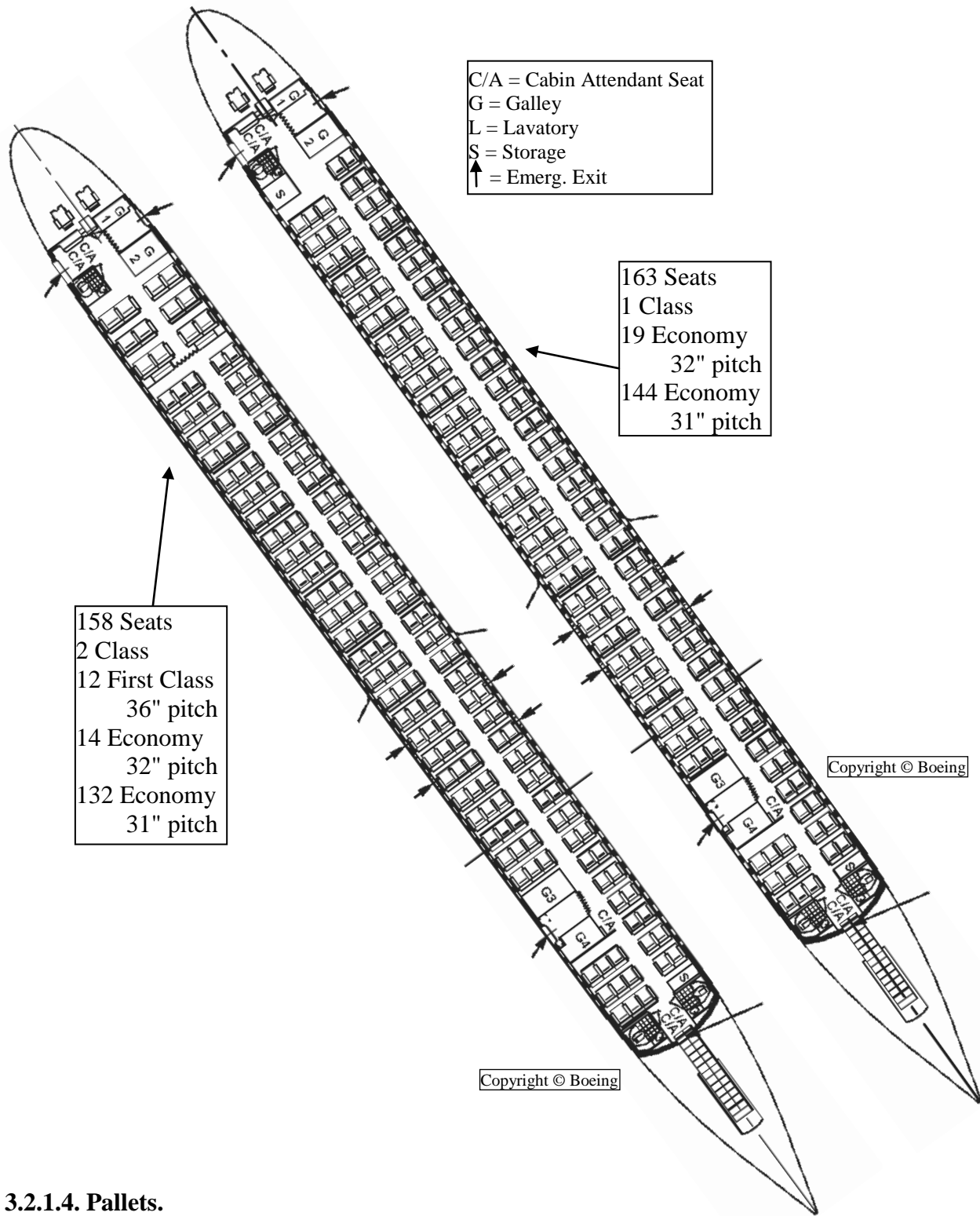


3.2.1.2. Main Door.

N/A this model

3.2.1.3. Compartment Dimensions.

Figure 3.4. Typical Passenger Configurations MD-90-30.



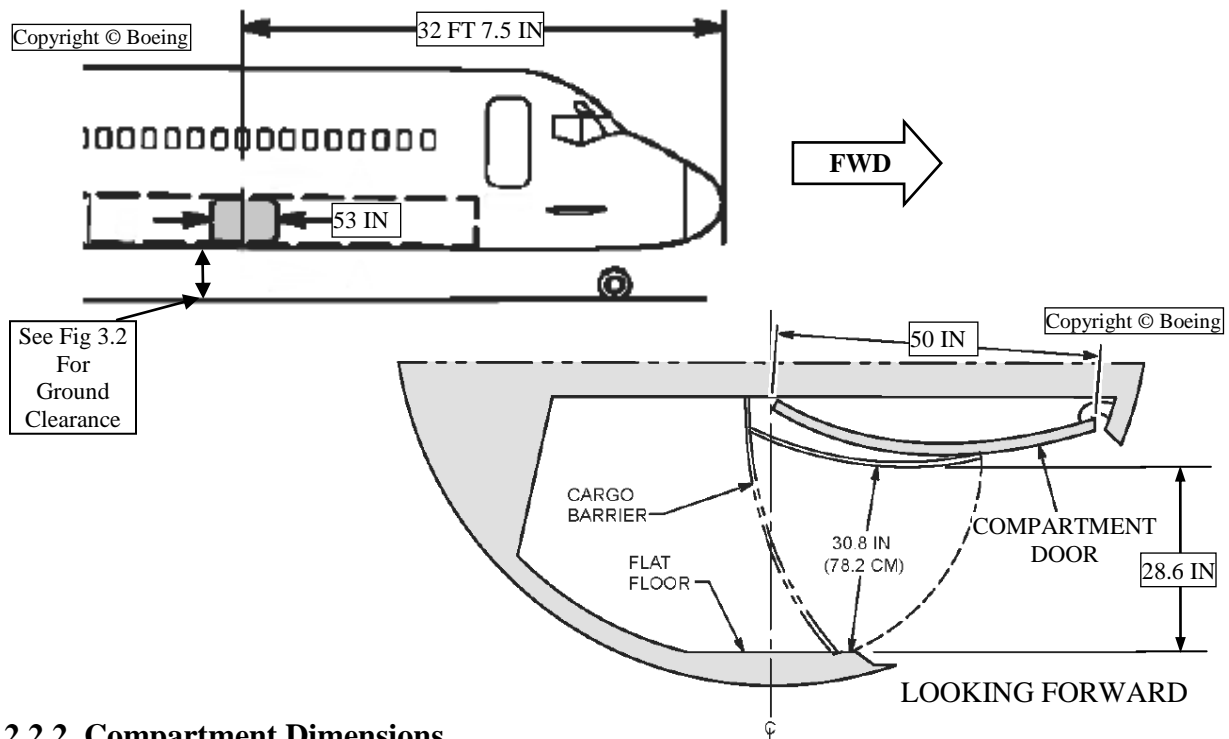
3.2.1.4. Pallets.

N/A this model

3.2.2. FORWARD COMPARTMENT.

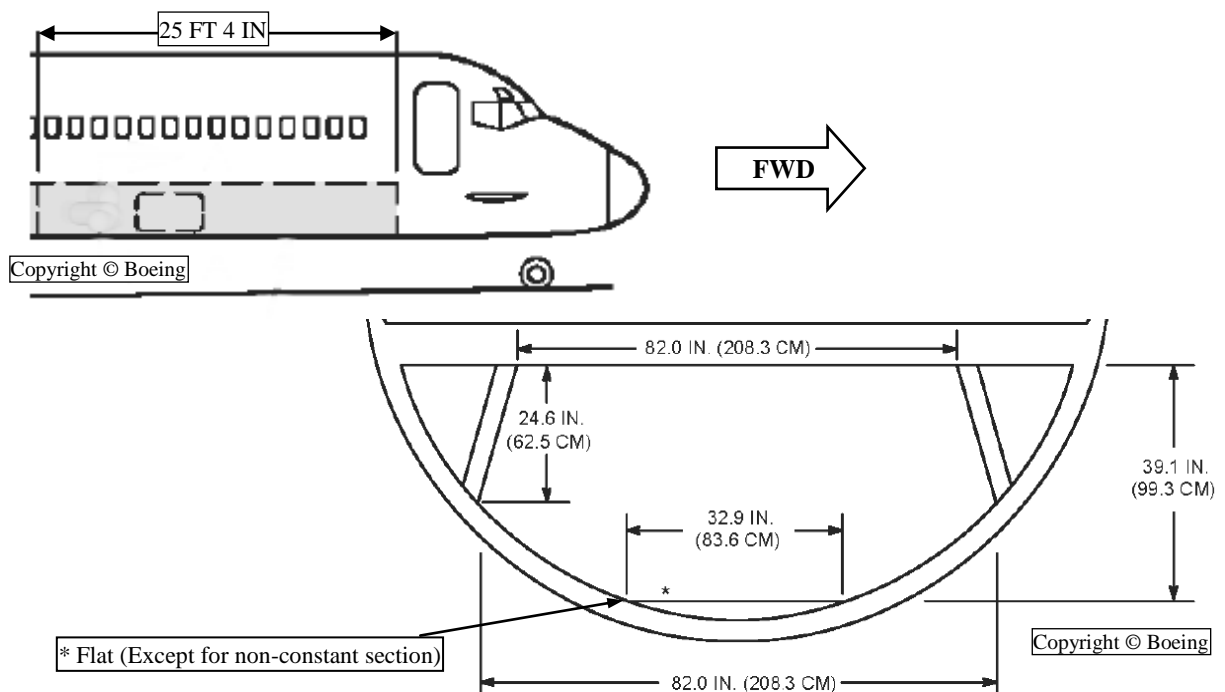
3.2.2.1. Door.

Figure 3.5. Forward Compartment Door MD-90-30.



3.2.2.2. Compartment Dimensions.

Figure 3.6. Forward Compartment Dimensions MD-90-30.

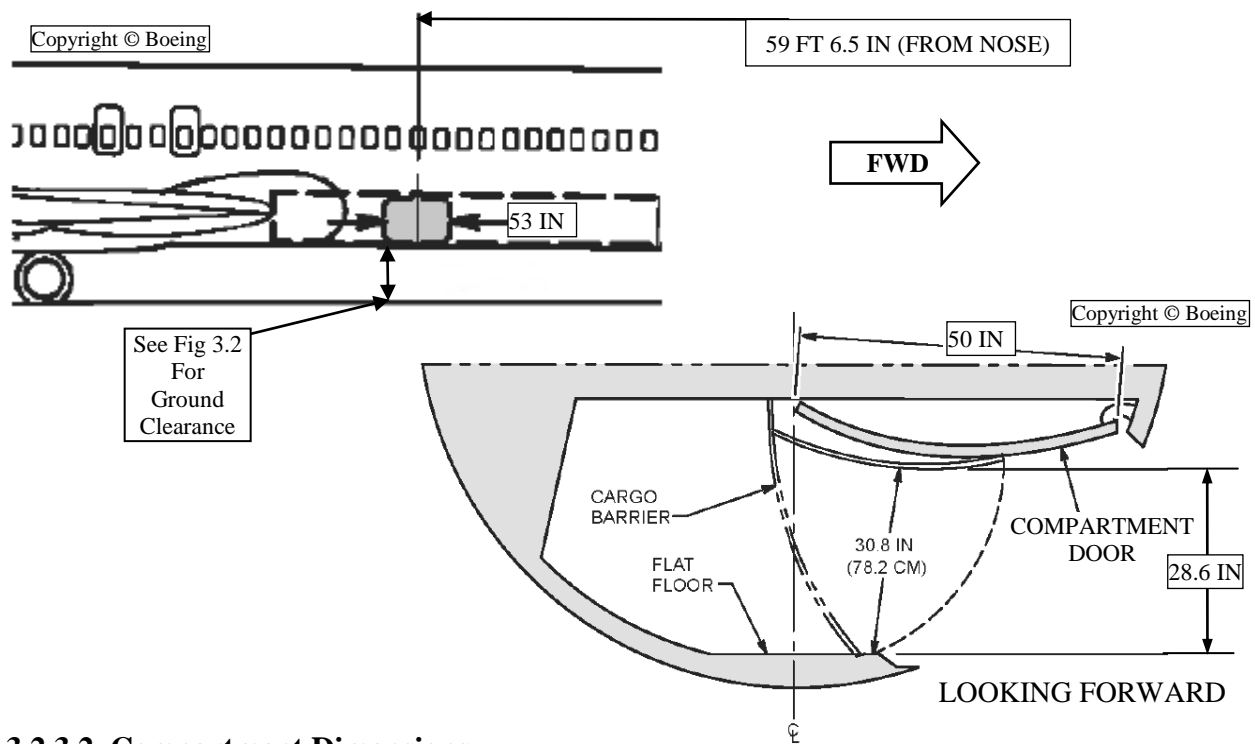


3.2.2.3. Pallets. 88" x 125" pallets cannot be loaded in this compartment.

3.2.3. MIDDLE COMPARTMENT.

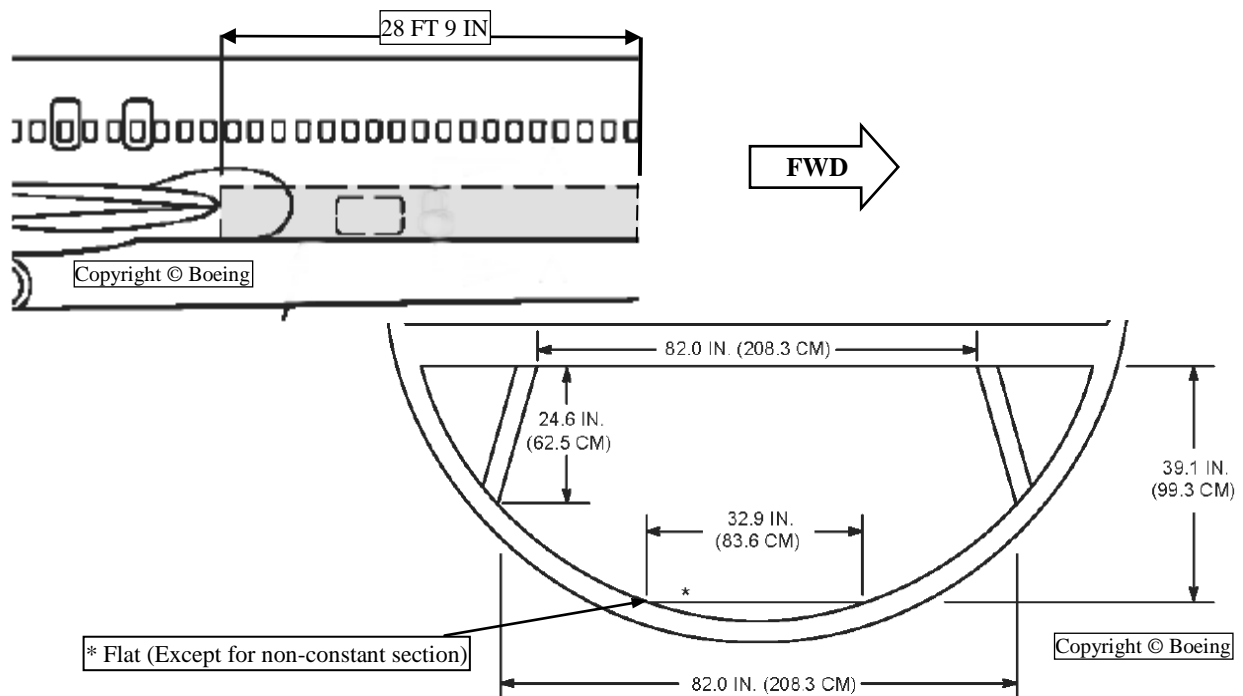
3.2.3.1. Door.

Figure 3.7. Middle Compartment Door MD-90-30.



3.2.3.2. Compartment Dimensions.

Figure 3.8. Middle Compartment Dimensions MD-90-30.

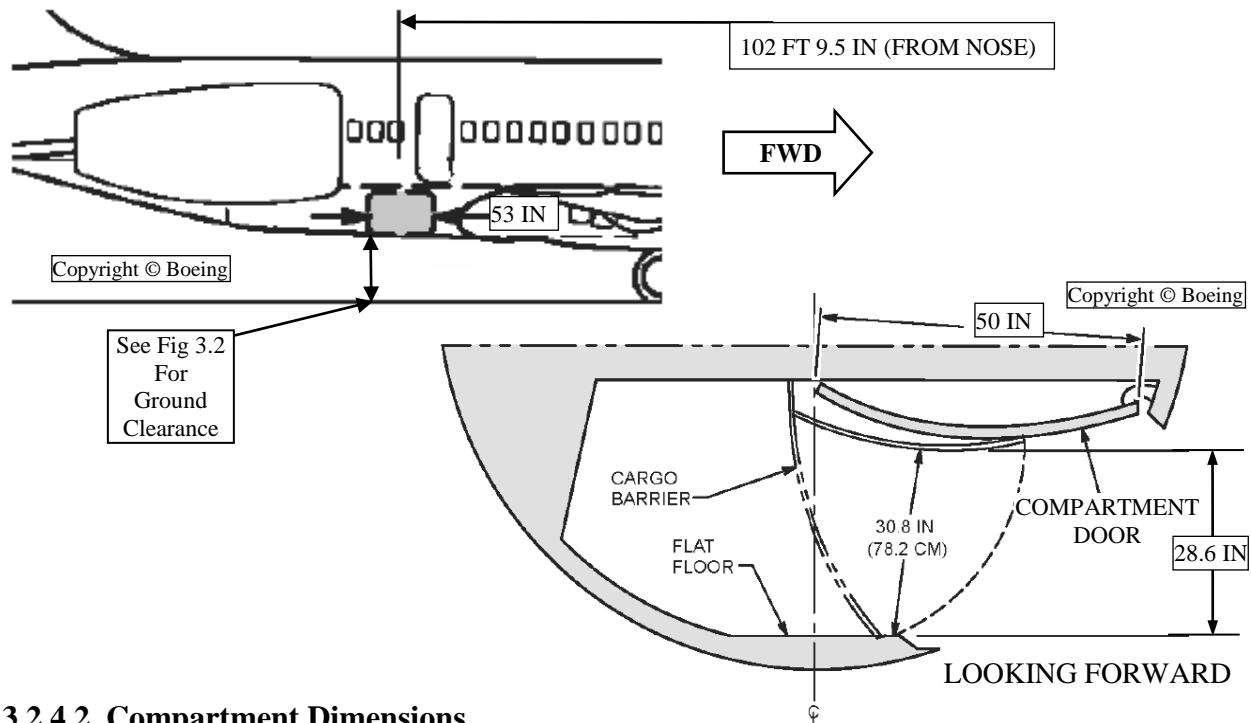


3.2.3.3. Pallets. 88" x 125" pallets cannot be loaded in this compartment.

3.2.4. AFT COMPARTMENT.

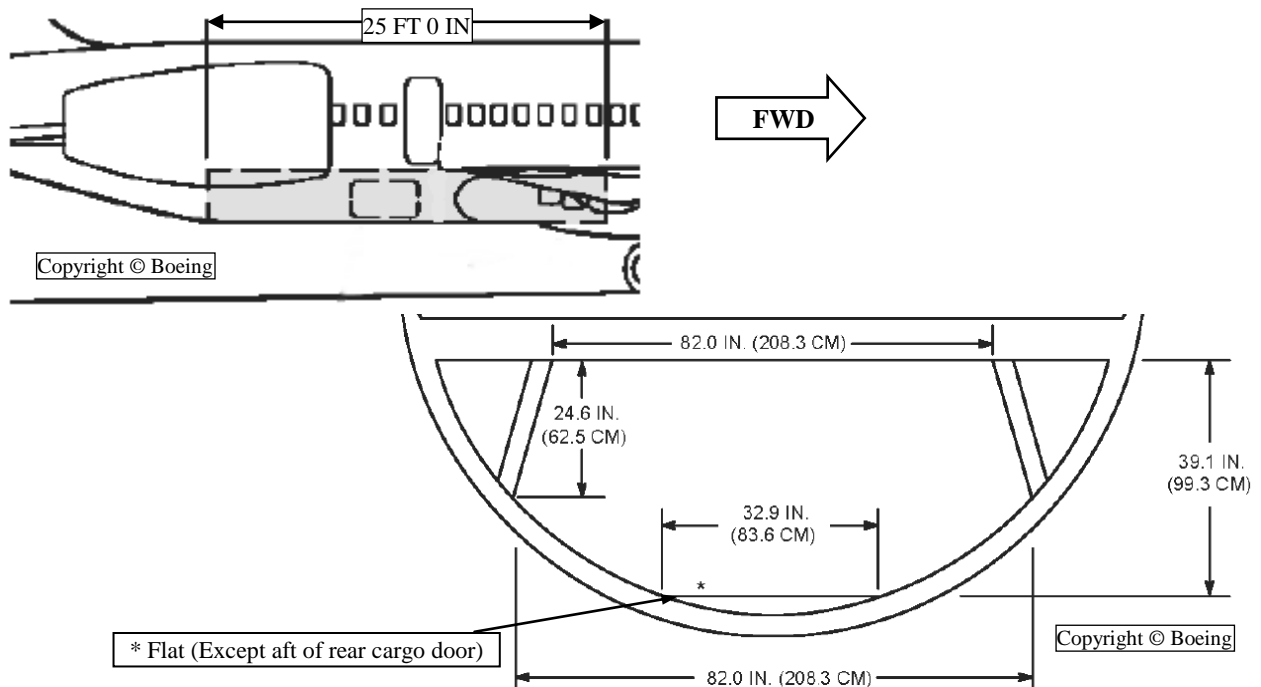
3.2.4.1. Door.

Figure 3.9. Aft Compartment Door MD-90-30.



3.2.4.2. Compartment Dimensions.

Figure 3.10. Aft Compartment Dimensions MD-90-30.



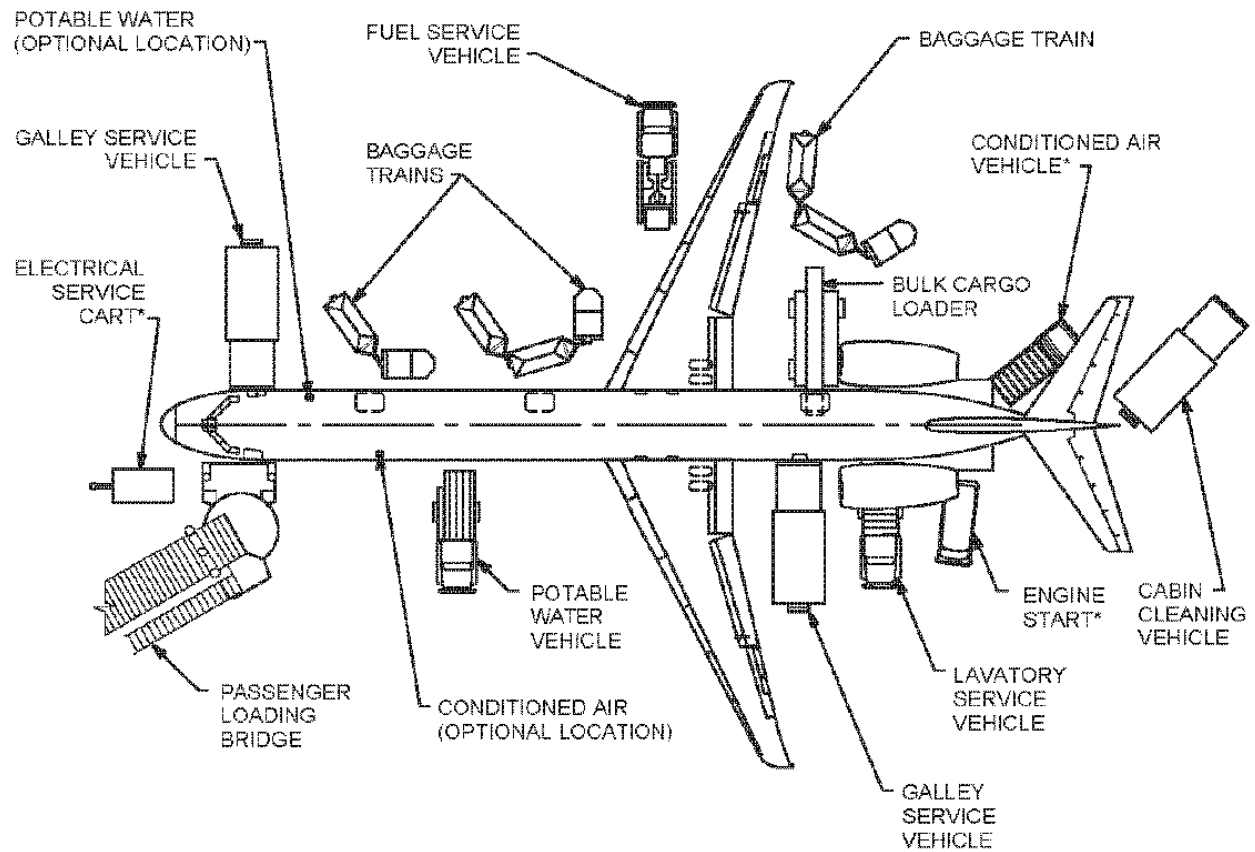
3.2.4.3. Pallets. 88" x 125" pallets cannot be loaded in this compartment.

3.2.5. BULK COMPARTMENT. N/A this model

3.3. SERVICING DIAGRAMS.

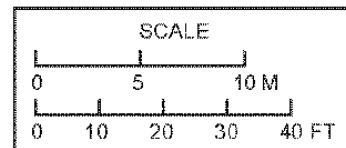
3.3.1. Servicing.

Figure 3.11. Typical Servicing Arrangement MD-90-30.



* AUXILIARY POWER UNIT OR FIXED FACILITIES CAN ALSO PROVIDE:

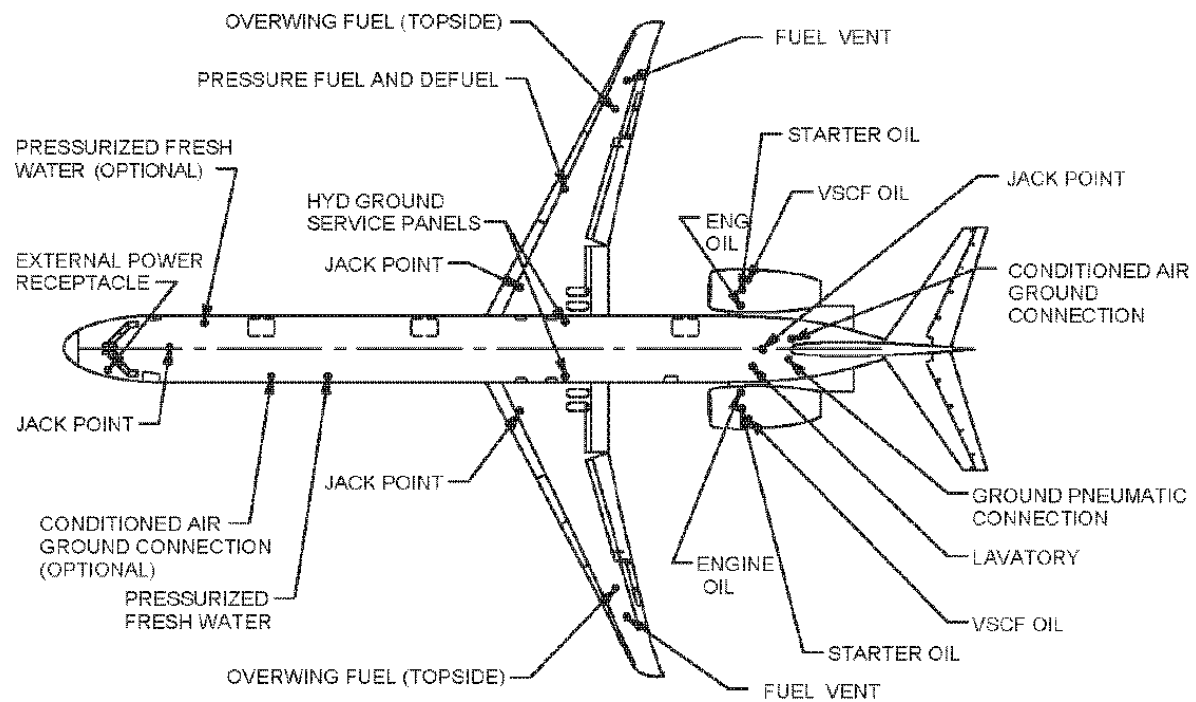
1. ELECTRICAL POWER
2. ENGINE START
3. AIR-CONDITIONING



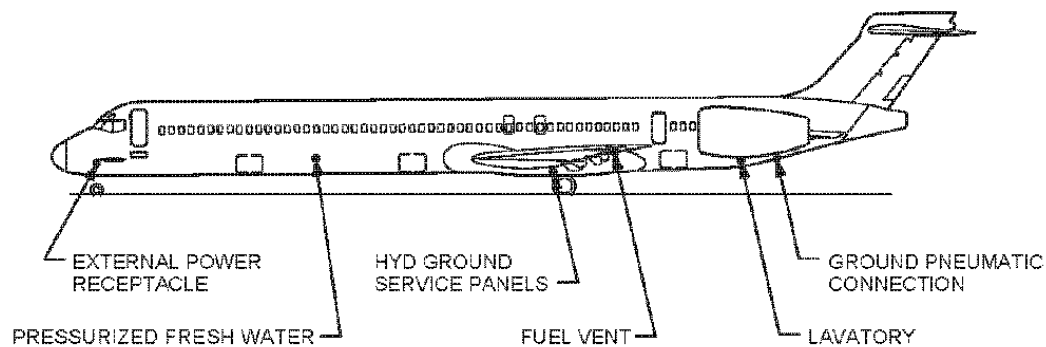
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3.3.2. Ground Connections.

Figure 3.12. Ground Service Connections MD-90-30.

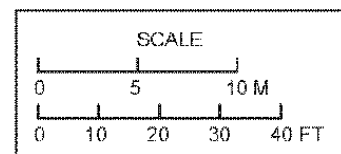


TOP VIEW



SIDE VIEW

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3.3.3. Air Stairs.

Figure 3.13. Forward Stairs MD-90-30.

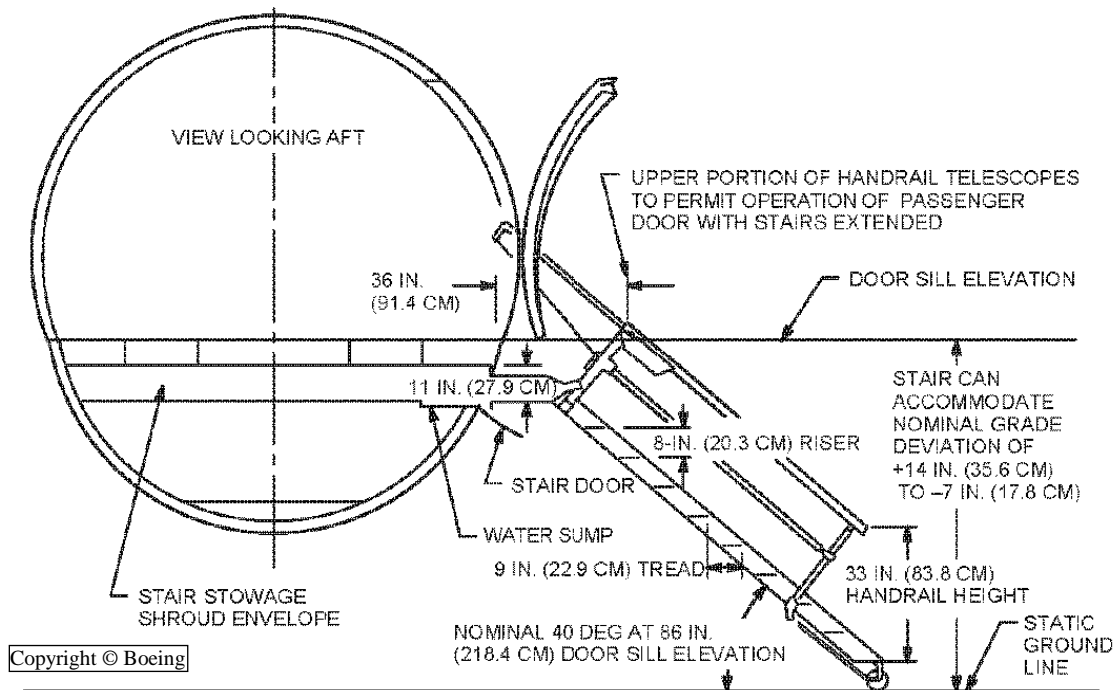
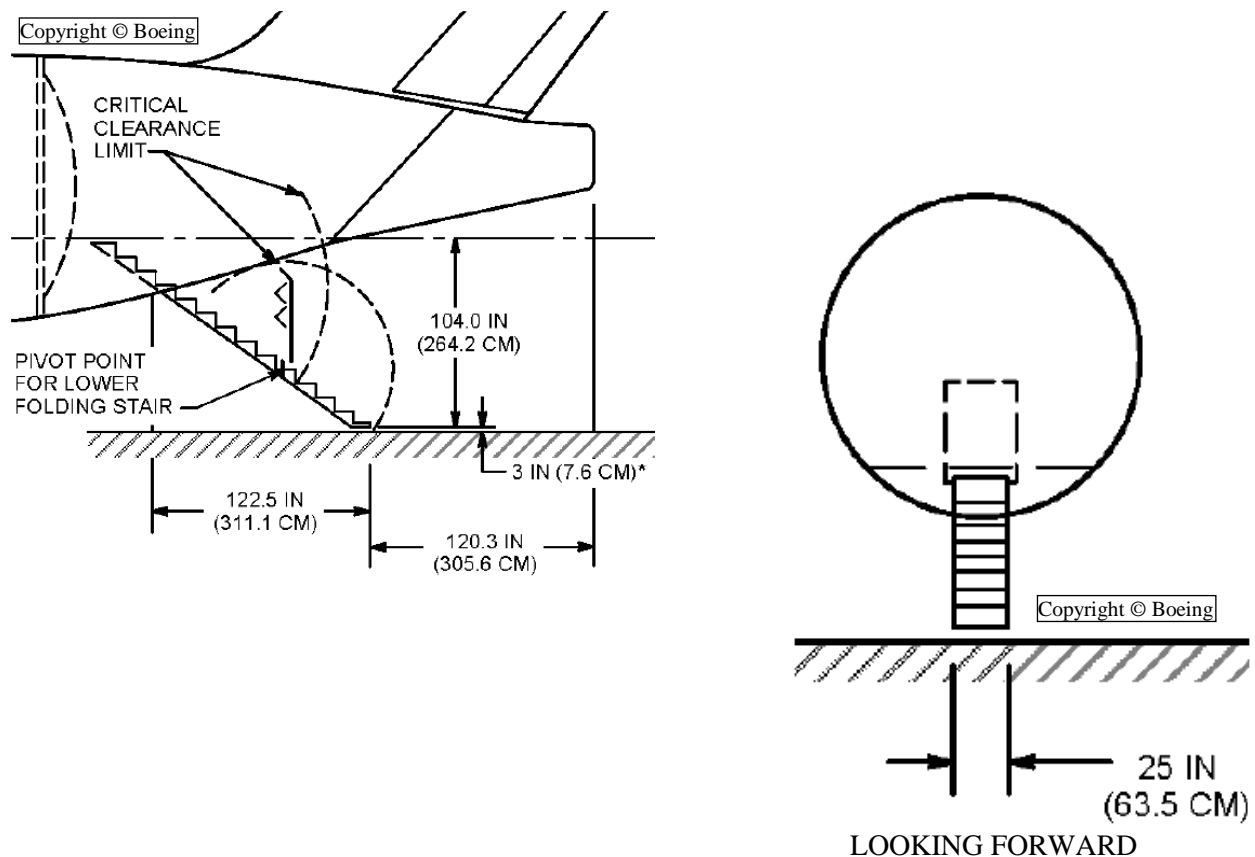


Figure 3.14. Aft Stairs MD-90-30.

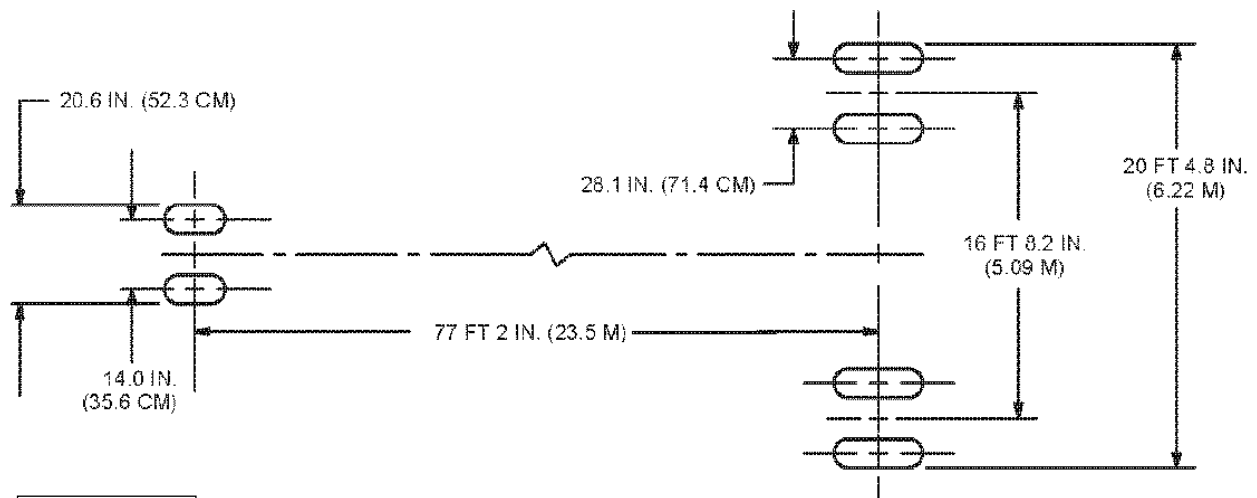


3.4. AIRFIELD SUITABILITY.

3.4.1. Landing Gear Footprint.

Figure 3.15. Landing Gear Footprint MD-90-30.

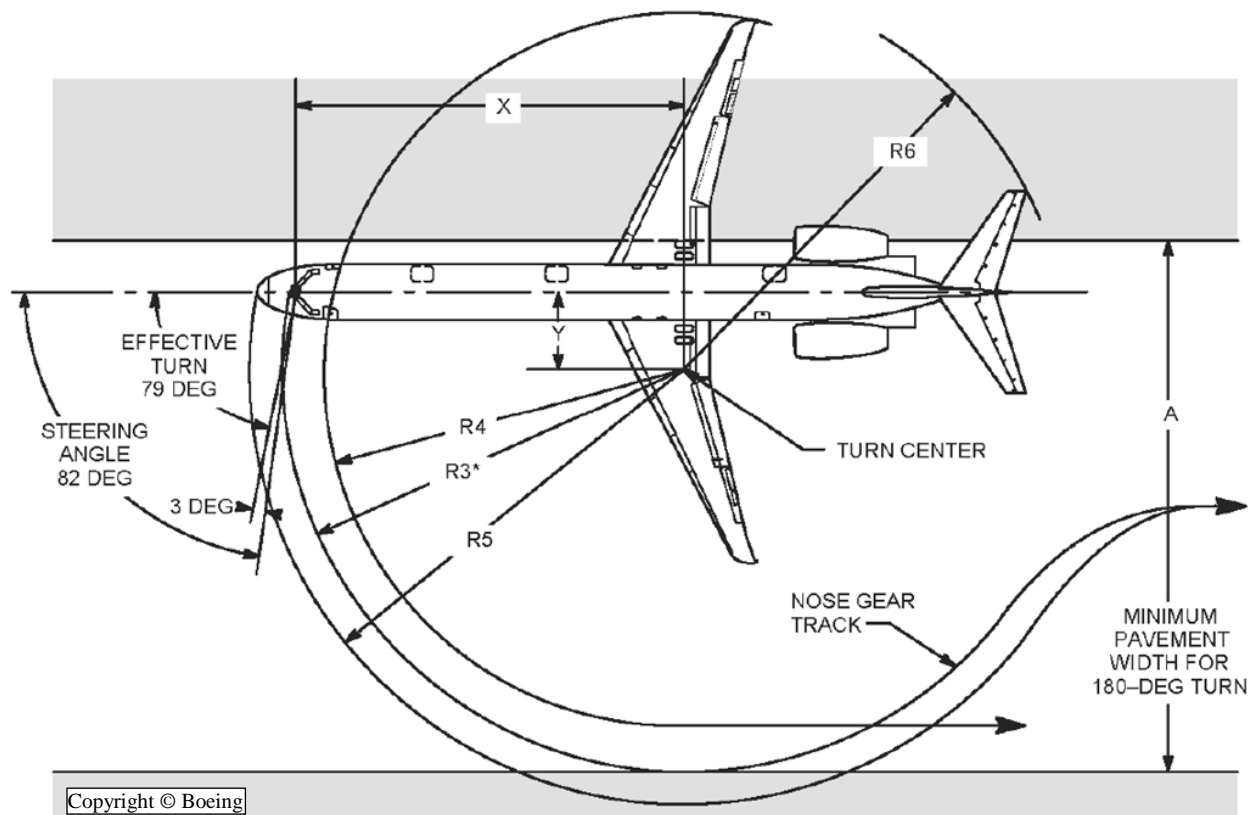
	MD-90-30	MD-90-30ER
Max Taxi Wt.	157,000 lb (71,214 kg)	168,500 lb (76,430 kg)
Nose Gear Tire Size	26 x 6.6 12 PR	
Nose Gear Tire Press.	160 psi (11.3kg/cm ²)	170 psi (11.9 kg/cm ²)
Main Gear Tire Size	H44.5 x 16.5 - 21 26 PR	
Main Gear Tire Press.	190 psi (13.4 kg/cm ²)	193 psi (13.6 kg/cm ²)



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3.4.2. Minimum Turning Radii.

Figure 3.16. Minimum Turning Radii MD-90-30.



NOTE:

- 3° Tire Slip Angle assumes 82° Nose Wheel deflection during very slow turning
- Consult Airline for actual operating data
- No differential braking or unsymmetrical thrust
- * R3 is measured to outside face of tire

Effective Turn Angle	X	Y	A	R3	R4	R5	R6
79°	77.2' (23.5m)	15.0' (4.6m)	104.7' (31.9m)	79.5' (24.2m)	70.5' (21.5m)	86.1' (26.2m)	76.4' (23.3m)

3.4.3. Parking Footprint. No manufacturer diagrams available.

FREDERICK H. MARTIN, Brig Gen, USAF
Director of Operations

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References*****Department of Defense / Unified Combatant Commands**

[DTR 4500.9-R](#), *Defense Transportation Regulation – Part III Mobility*, September 2007

DTR 4500.9-R, [Appendix J](#) – *Hazardous Materials (HAZMAT) Certification and Mobility Procedures*, September 2007

DTR 4500.9-R, [Appendix K](#) – *Hazardous Materials (HAZMAT) Special Permits (SP)*, April 2011

DTR 4500.9-R, [Appendix V](#) – *Aircraft Load Planning and Documentation*, April 2011

DTR 4500.9-R, [Appendix BB](#) – *Procedures for Transporting Weapons, Ammunition and Hazardous Materials (HAZMAT) Aboard Commercial Aircraft in Scheduled Service and Department of Defense (DOD) – Owned or Controlled Aircraft*, April 2011

Air Force

[AFDD 2-6](#), *Air Mobility Operations*, 1 March 2006

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[AMCI 10-402](#), *Civil Reserve Air Fleet (CRAF)*, 27 April 2010

[AMCI 24-201](#), *Commercial Airlift Management - Civil Air Carriers*, 1 July 2004

Other Agencies

ATTLA, MIL-HDBK-1791, *Designing for Internal Aerial Delivery in Fixed Wing Aircraft*, 14 February 1997

IATA, *ULD Technical Manual (ULD)*

Airbus, 198 Van Buren Street Suite 300 Herndon, VA 20170

Boeing, P. O. Box 3707 Seattle, Washington 98124

Prescribed Forms

No Forms or IMT's prescribed by this publication

Adopted Forms

AF Form 847, Recommendation for Change of Publication

[DD Form 2130-5](#), DC 10-10/30CF Load Plan

[DD Form 2130-8](#), DC 8-50 Series F/CF Load Plan

[DD Form 2130-9](#), DC 8-61/71-63/73F/CF Load Plan

[DD Form 2130-10](#), DC 8-62CF Load Plan

[DD Form 2130-11](#), B707-300C Load Plan

[DD Form 2130-12](#), B747-100F/200C/200F Load Plan

[DD Form 2130C](#), Aircraft Load Plan Continuation

[JP 3-17](#), *Joint Doctrine and Joint Tactics, Techniques, and Procedures for Air Mobility Operations*